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| 09/742,576 | 12/20/2000 | Shigeru Eiho | 55495(904) | 8513 |

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| EXAMINER | |
|---|---|
| HERNANDEZ, NELSON D | |
| **ART UNIT** | **PAPER NUMBER** |
| 2612 | |

DATE MAILED: 12/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/742,576 | EIHO ET AL. | |
| | Examiner | Art Unit | |
| | Nelson D. Hernandez | 2612 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *26 July 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *10-13,23-26 and 31-35* is/are allowed.

6)☒ Claim(s) *1,2,5-7,9,14,18-20,22 and 27* is/are rejected.

7)☒ Claim(s) *3,4,8,15-17,21 and 28-30* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 December 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *April 6, 2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Information Disclosure Statement*

1. The information disclosure statement filed on October 5, 2001 fails to comply with the provisions of 37 CFR 1.97, 1.98 and MPEP § 609 because the following reference is not available to the examiner: "Chest Radiograph Enhancement Using the Weighted Unsharp Mask", Jackson et al. It has been placed in the application file, but the information referred to therein has not been considered as to the merits. Applicant is advised that the date of any re-submission of any item of information contained in this information disclosure statement or the submission of any missing element(s) will be the date of submission for purposes of determining compliance with the requirements based on the time of filing the statement, including all certification requirements for statements under 37 CFR 1.97(e). See MPEP § 609 ¶ C(1).

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims **1**, **5**, **14**, **18** and **27** are rejected under 35 U.S.C. 103(a) as being unpatentable over Jain, "Fundamentals of Image Processing", 1989.

Regarding claim **1**, Jain discloses an image-processing method, which carries out a unsharpening process by adding to the image data of the original image the second-order differential (See equation 9.20, page 351) with respect to each pixel, the

second order differential being obtained by 1) defining the distribution of image data of an original image as a function, and 2) taking the Laplacian of that function, wherein the degree of the unsharpening process is controlled by altering a first parameter "λ" (See equation 7.31, page 249) for determining the size of the second-order differential to be added to the image data of the original image (Pages 248-249; pages 351-353). The process discussed by Jain is an unsharpening process and not a sharpening process. However, by making the first parameter $\lambda<0$, the formula for unsharpening discussed in Jain would become a shapening formula. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to change the first parameter in Jains's formula to a value less than zero to perform sharpening. The motivation to do so would help an imaging system to enhanced blurred images.

Regarding claim **5**, Jain disclose that image enhancement can be perform to color images by independently transforming the input color coordinates of each pixel into another set of color coordinates, where the image in each coordinate is enhanced by its own (monochrome) image enhancement algorithm (Page 262-263, Section 7.8).

Regarding claim **14**, Jain as discussed in claim 1, teaches a recording medium, which has an image-processing program recorded therein, the image-processing program being arranged to allow a computer to carry out a sharpening process by subtracting from the image data of the original image the second-order differential with respect to each pixel, the second order differential obtained by 1) defining the distribution of image data of an original image as a function, and 2) taking the Laplacian of that function, wherein the computer is allowed to execute a process for controlling the

degree of the sharpening process altering a first parameter for determining the size of the second-order differential to be subtracted from the image data of the original image. Since Jain teaches the sharpening process as algorithms to be used in image processing programs and represent the process with computer generated images of said processes, the use of a memory for storing those programs is necessitated in Jain and Chan. Grounds for rejecting claim 1 apply here.

Regarding claim **18**, Jain disclose that image enhancement can be perform to color images by independently transforming the input color coordinates of each pixel into another set of color coordinates, where the image in each coordinate is enhanced by its own (monochrome) image enhancement algorithm (Page 262-263, Section 7.8).

Regarding claim **27**, Jain discloses an image-processing method, wherein an unsharpening process is carried out based on the following equation:

$v(m,n) = u(m,n) - \lambda g(m,n)$, (Formula 7.31, page 249), wherein $u(m,n)$ is a pixel value of a target pixel in an original image, $v(m,n)$ is a pixel value of the target pixel after carrying out the unsharpening process with respect to the original image, and $g(m,n)$ is a function commonly used as the Laplacian $\nabla^2 f(i,j)$ (See page 351, formula 9.20) is a function obtained by carrying out a Laplacian process based on the pixel value of the target pixel and pixel values of a plurality of pixels adjacent to the target pixel, and a resulting output value of $v(m,n)$ from the unsharpening process is adjusted by setting a value "$\lambda$" variable. The process discussed by Jain is an unsharpening process and not a sharpening process. However, by making the first parameter $\lambda < 0$, the formula for unsharpening discussed in Jain would become a sharpening formula. Therefore, it

would have been obvious to one of ordinary skill in the art at the time the invention was made to change the first parameter in Jains's formula to a value less than zero to perform sharpening. The motivation to do so would help an imaging system to enhanced blurred images.

4. Claims **2**, **6**, **7**, **9**, **19**, **20** and **22** are rejected under 35 U.S.C. 103(a) as being unpatentable over Jain, "Fundamentals of Image Processing", 1989 in view of Chan, US Patent 6,665,447 B1.

Regarding claim **2**, Jain does not explicitly disclose that data that is representative of the characteristic of the image data is extracted from the inputted image data, and the first parameter is set by inputting this data to a predetermined algorithm.

However, Chan teaches a method for enhancing image data by sharpening wherein data representative of the characteristic of the image data is extracted from the inputted image data, and a gain being used for determining the amount of sharpening is set by inputting this data to a predetermined algorithm (Col. 4, lines 21-57; col. 5, lines 21-44).

Therefore, taking the combined teaching of Jain in view of Chan as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Jain by setting the first parameter by inputting the data representative of the characteristic of the image to a predetermined algorithm. The motivation to do so would help the sharpening process to sharpen real objects in the image and to avoid the sharpening of JPEG compression artifacts as suggested by Chan (Col. 4, lines 21-49).

Regarding claim **6**, Jain discloses an image-processing method, which carries out an unsharpening process by subtracting from the image data of the original image the second-order differential with respect to each pixel, the second order differential being obtained by first defining the distribution of image data of an original image as a function. The process discussed by Jain is an unsharpening process and not a sharpening process. However, by subtracting the second differential, the formula for unsharpening discussed in Jain would become a sharpening formula.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to change the first parameter in Jains's formula to a value less than zero to perform sharpening. The motivation to do so would help an imaging system to enhanced blurred images.

Jain does not teach that the second-order differential is obtained by the sum total of differences in value between a target pixel and a plurality of pixels in the vicinity thereof, and each of the differences is multiplied by a coefficient, with the coefficient being varied depending on the size of the corresponding difference.

However, Chan teaches a method for enhancing image data by sharpening wherein a second differential is used for performing said sharpening process. Wherein the second differential is obtained by the sum total of differences in value between a target pixel and a plurality of pixels in the vicinity thereof, and each of the differences is multiplied by a coefficient (Gain), with the coefficient being varied depending on the size of the corresponding difference (Col. 4, lines 21-57; col. 5, lines 21-44).

Therefore, taking the combined teaching of Jain in view of Chan as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Jain using defining the second differential as the sum total of differences in value between a target pixel and a plurality of pixels in the vicinity thereof, and each of the differences is multiplied by a gain, with the coefficient being varied depending on the size of the corresponding difference. The motivation to do so would help the sharpening process to sharpen real objects in the image and to avoid the sharpening of JPEG compression artifacts as suggested by Chan (Col. 4, lines 21-49).

Regarding claim **7**, the combination of Jain in view of Chan teaches that the coefficient is set to be different values depending on cases in which the difference is greater than a second parameter and in which the difference is smaller than the second parameter, and the degree of the sharpening process is controlled by altering the second parameter (See Chan, col. 4, line 50 – col. 5, line 40; col. 5, lines 64-67).

Regarding claim **9**, Jain disclose that image enhancement can be perform to color images by independently transforming the input color coordinates of each pixel into another set of color coordinates, where the image in each coordinate is enhanced by its own (monochrome) image enhancement algorithm (Page 262-263, Section 7.8).

Regarding claim **19**, the combination of Jain in view of Chan as applied to claim 6 teaches a recording medium, which has an image-processing program recorded therein, the image-processing program being arranged to allow a computer to carry out a sharpening process by subtracting from the image data of the original image the second-order differential with respect to each pixel, the second order differential being

obtained by first defining the distribution of image data of an original image as a function, the computer being allowed to execute a process wherein: the second-order differential is obtained by the sum total of differences between a target pixel and a plurality of pixels in the vicinity thereof, and each of the differences is multiplied by a coefficient, with the coefficient being varied depending on the size of the corresponding difference. Since both, Jain and Chan teach the sharpening process as algorithms to be used in image processing programs and represent the process with computer generated images of said processes, the use of a memory for storing those programs is necessitated in Jain and Chan. Grounds for rejecting claim 6 apply here.

Regarding claim **20**, the combination of Jain in view of Chan as applied in claim 7, discloses that the computer is allowed to execute a process wherein: the coefficient is set to be different values depending on cases in which the difference is greater than a second parameter and in which the difference is smaller than the second parameter, and the degree of the sharpening process is controlled by altering the second parameter. Grounds for rejecting claim 7 apply here.

Regarding claim **22**, Jain disclose that image enhancement can be perform to color images by independently transforming the input color coordinates of each pixel into another set of color coordinates, where the image in each coordinate is enhanced by its own (monochrome) image enhancement algorithm (Page 262-263, Section 7.8).

***Allowable Subject Matter***

5. Claims **10-13**, **23-26** and **31-35** are allowed.

6. The following is a statement of reasons for the indication of allowable subject matter: prior art of records, neither anticipates nor renders obvious that the second-order differential has at least one of an upper limit and a lower limit, and the degree of the sharpening process is controlled by altering a third parameter for determining the upper limit and/or the lower limit and that in the Laplacian process, adjacent pixels whose pixel values are not different from that of the target value by more than a parameter θ are not subjected to the Laplacian process, and a resulting output value for g(i, j) from the sharpening process is adjusted using the parameter θ which is a set variable.

Regarding claims **10**, **23**, **31** and **34**, Jain discloses an image-processing method, which carries out a unsharpening process by adding to the image data of the original image the second-order differential (See equation 9.20, page 351) with respect to each pixel, the second order differential being obtained by 1) defining the distribution of image data of an original image as a function, and 2) taking the Laplacian of that function, wherein the degree of the unsharpening process is controlled by altering a first parameter "λ" (See equation 7.31, page 249) for determining the size of the second-order differential to be added to the image data of the original image (Pages 248-249; pages 351-353). The process discussed by Jain is an unsharpening process and not a sharpening process. However, by making the first parameter $\lambda<0$, the formula for unsharpening discussed in Jain would become a sharpening formula. Therefore, it

would have been obvious to one of ordinary skill in the art at the time the invention was made to change the first parameter in Jains's formula to a value less than zero to perform sharpening.

However, Jain fails to teach or suggest that the second-order differential has at least one of an upper limit and a lower limit, and the degree of the sharpening process is controlled by altering a third parameter for determining the upper limit and/or the lower limit. Jain also fails to teach or suggest that in the Laplacian process, adjacent pixels whose pixel values are not different from that of the target value by more than a parameter θ are not subjected to the Laplacian process, and a resulting output value for g (i, j) from the sharpening process is adjusted using the parameter θ which is a set variable.

7. Claims **3**, **4**, **8**, **15-17**, **21** and **28-30** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Conclusion***

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

***Contact***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nelson D. Hernandez whose telephone number is (703) 305-8717. The examiner can normally be reached on 8:30 A.M. to 6:00 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wendy R. Garber can be reached on (703) 305-4929. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Nelson D. Hernandez
Examiner
Art Unit 2612

NDHH
December 22, 2004

AUNG MOE
PRIMARY EXAMINER